

# Signal and Image Processing

*Computer methods for visualization, increased sensitivity, and quantitative analyses*

**I**maging technology, and image analysis are an ever increasing part of nondestructive investigations. In recent years, the NDE Section has assembled and developed tools that couple image processing with computational NDE algorithms. We have converged on the VIEW code as the tool for connecting state-of-the-art computational NDE with the wide variety of signal- and image-processing functions. Our focus areas include: dimensional measurements, edge detection and image enhancement, focused wave mode calculations for ultrasonic inspections, in-depth examinations of image reconstruction techniques, and statistical studies of different NDE algorithms.

## APPLICATIONS

- Modeling and simulation
- Data acquisition and preprocessing
- Feature enhancement
- Graphic rendering and display
- Dimensional measurement
- Reverse engineering

## State-of-the-art hardware

We have access to powerful computers for data processing, modeling, simulation, analysis and semi-automatic decision-making. In NDE, we make use of various levels of computer technology—PCs for fast, efficient data collection, engineering workstations for individual data analysis and display, supercomputers (Cray and parallel processors) for extensive modeling of objects

and their effects on penetrating radiation, and high-speed graphics processors for 3-D display of volumetric data. This level of hardware is generally unavailable to most industrial NDE labs. Our computations hardware includes:

- SGI Iris Indigo Workstations
- SGI Iris Power Onyx
- Sun Sparc Workstations
- 1 SUN-4 File Server
- 1 Tektronix 4693D Color Printer
- 1 Tektronix Phaser II Color Printer.

## Software categories

Our software falls into five categories:

- (1) Modeling and simulation for determining optimal scan parameters and researching new imaging methodologies
- (2) Data acquisition and preprocessing
- (3) Volume processing and reconstruction
- (4) Graphical rendering and display
- (5) Detection and decision analysis.

Much of this software was developed in-house and is being used by many groups outside LLNL. By using this software in conjunction with commercial CAD/CAM software, we are connecting our analysis work back to the designers for such things as internal dimensional measurements and design for inspectability.

## Most valuable asset

Our most valuable asset is the knowledge and experience of our engineers and scientists. Each year we add to the body of research knowledge through technical papers, conference presentations, and educational programs with universities. We also bridge the gap between research and practical application by working closely with both the defense establishment and industrial partners.

**Availability:** Our unmatched computational and experimental expertise in NDE is available now for industrial partnering.

## Contact

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